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# BOTANICAL GAZETTE

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## SOME ROCKY MOUNTAIN CHRYSOTHAMNI.

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AFTER an experience of several years as a collector and as a student of this group both in the field and in the herbarium, I have reached the conclusion that the genus *Chrysothamnus*, as it exists in the Rocky mountains, is still to an unsuspected degree unknown and unappreciated.

The plants of the far west became known to the botanical world at an earlier day than those of the interior west, and it seems to have been assumed that the species of the two regions ought to be the same. As a result of this assumption we have been producing a confusion in the herbaria that will be cleared up with difficulty. Dr. Greene's<sup>1</sup> papers on this genus represent the first attempt to do justice to the species of the range in question. In this genus, as in many others, Nuttall's knowledge obtained in the field has been discounted, but, like other attempts to subordinate his species, it has simply resulted in confusion.

The following notes it is hoped may be serviceable not only to resident students, but to all who are interested in this characteristic western genus. The new species that are proposed, while intended in some instances to simplify by segregation, are in others believed to represent species not heretofore collected. Only such species are included in this paper as belong

<sup>1</sup> *Erythea* 3 : 92-96 ; 107-115. 1895.

to that natural botanical region of which Wyoming, with its high arid plains and mountain ranges, is the center. Localities mentioned are in Wyoming unless otherwise stated.

**CHRYSOTHAMNUS GRAVEOLENS** Nutt.—For the literature of this species and a thoroughly usable characterization see *Erythraea* 3: 108. 1895. Its range as there given, and the habitat, “denuded soils,” given by Nuttall, will prevent confusing with this certain other species that have been too often included. Thoroughly typical are the following collections: George E. Osterhout, New Windsor, Colo., September 8, 1898; the writer’s nos. 503 and 2758 from the Platte cañon, in 1894 and 1896.

**CHRYSOTHAMNUS PLATTENSIS** Greene, Pitt. 4: 42. 1899. *C. speciosus Plattensis* Greene, *Erythraea* 3: 111. 1895.—This is the representative in this range of the far northwestern *C. speciosus* Nutt.<sup>2</sup> I know of no specimens except from the eastern base of the Rockies. Well represented by the following collections: C. S. Crandall, Fort Collins, Colo., September 17, 1898; George E. Osterhout, New Windsor, Colo., September 8, 1898; E. L. Greene, LaSalle, Colo., September 10, 1896; the writer, Cheyenne, Wyo., August 27, 1896.

**Chrysothamnus pulcherrimus**, n. sp.—Shrub 0.5–1.5<sup>m</sup> high, tree-like in form (a short trunk-like base much branched above); main stem and branches with grayish bark, the season’s stems yellow but under the lens minutely lanate-puberulent, rather slender-virgate, terminating in an ample, compact, paniculate cluster: leaves moderately numerous, narrowly linear, rather lax and spreading, 5–8<sup>cm</sup> long, from white-tomentose to greenish-glabrate: involucre bracts only two or three in each row, oblong, acute, nearly glabrous, ciliate on the margins: corolla tube longer than the throat into which it gradually expands, rather closely short-hairy: anthers well exerted, the appendages of the style exceeding these: akene softly pubescent.

A handsome shrub, its arboreous habit, numerous, slender branchlets, and large trusses of bright yellow flowers make it one of the strongly characterized and conspicuous species. It is to be distinguished from *C. graveolens*

<sup>2</sup> This and its var. *albicaulis* is sometimes reported from this range, but I believe cannot be authenticated.

Nutt., to which it is allied on the one side, by its less glabrate condition, its narrower leaves, yellow stems, paniculate (not corymbose) inflorescence, and proportionately shorter style appendages. From *C. speciosus* Nutt., to which it must be compared on the other side, by its stout yellow (not whitish) branchlets, its longer less filiform leaves, glabrate involucre bracts, pubescent corolla tube, and more open-paniculate inflorescence.

Under no. 2066 it has been distributed as *C. speciosus*, from Cummins, August 10, 1896. Collected near the same locality (Wood's Landing), August 9, 1897, no. 3477, the latter taken as the type number. Specimens from Gros Ventre river, August 23, 1894, no. 966, is a form with more virgate and glabrate branchlets.

**CHRYSOTHAMNUS PULCHERRIMUS fasciculatus**, n. var.—size and habit of the species; the season's branchlets short, numerous, forming a brush-like fascicle at the ends of the woody branches: leaves numerous, short ( $2-3^{\text{cm}}$ ), somewhat rigid, green or yellowish-green, with a thin tomentum: inflorescence similar to that of the species but smaller, terminating the numerous branchlets.

The fascicled branchlets and short rigid leaves suggest *C. collinus* Greene, but the size, habit, inflorescence, and floral characters are those of *C. pulcherrimus*. *C. collinus*, in its pubescent long acuminate bracts, is quite in contrast to this.

First collected in 1894 on Boulder creek, August 26, no. 1120; in 1897 at Creston, August 28, no. 4419 and distributed as *C. speciosus*.

**CHRYSOTHAMNUS FRIGIDUS** Greene, l. c.—What is typical of this species is not quite clear (see note under var. *concolor*), but it seems plain that it was intended to include that superabundant but variable species of the high plains, popularly known as "rabbit-brush." It is illustrated by Dr. Greene's specimens from Laramie, August 10, 1895; the writer's nos. 2787, 5280, 5282, 5315.

**CHRYSOTHAMNUS FRIGIDUS concolor**, n. var.—Yellowish-green throughout except for the bright yellow flowers,  $3-4^{\text{dm}}$  high from a barely shrubby base, the numerous stems rather slenderly virgate, terminating in a narrow thyrsus (sometimes paniculate corymbose): leaves linear, erect or irregularly spreading,  $4-7^{\text{cm}}$  long,  $1-2^{\text{mm}}$  wide: bracts mostly acute, the outer with a light tomentum like that of the stems and leaves, all with a thin, scarious-ciliate margin: corolla tube short-pubescent.

Though I believe this to be a species, I hesitate to separate it from *C. frigidus* so long as I am unable to say what is typical of the latter. Ever since its publication (*Erythea* 3:112. 1895), based upon specimens (one of which I have) collected at Laramie by Dr. Greene, I have collected freely in this genus. Though in the center of distribution for *C. frigidus*, and in spite of the large series representing it, I have never secured duplicates of the specimens distributed by Dr. Greene, nor any quite typical, judged by the description. Assuming that the plant, so common on the Laramie plains, of which there seem to be several forms, must stand as *C. frigidus*, the preceding may at least be ranked as a variety, no matter what may be typical of the other. Nor may this be connected with *C. Plattensis*. Some forms of that seem to connect very closely with *C. frigidus*, but typical specimens of the two are really widely different. *C. Plattensis* one at once associates with *C. speciosus* on general appearance; not so with *C. frigidus* and the variety now proposed.

Collected on the banks of Hutton lakes, in rather sandy, but more or less alkali impregnated soil, September 6, 1898, no. 5300.

**Chrysothamnus pallidus**, n. sp.—A small tufted shrub, 2–5<sup>dm</sup> high, with a close felted tomentum which persists even on the old stems: stems rather scraggy branched, somewhat rigid, the season's twigs very short: leaves mostly confined to the season's growth, the tomentum looser than on the stems, ascending, irregularly spreading or reflexed, linear, acute, 2–3<sup>cm</sup> long, shorter and crowded at the base of the inflorescence: heads small, in thyrsoïd panicles or somewhat corymbosely clustered cymes; involucre short, sub-campanulate, its bracts short, oblong, sub-acute, ciliate-pubescent especially on the margins, about three in each row: tube of the corolla closely covered with short, clavellate hairs, the throat longer than the tube and cleft one third its length: style divisions exserted, the stigmatic portion about as long as the appendages: akenes densely pubescent, about equaling the corolla tube.

Allied to *C. frigidus* but distinguished by its more rigid, scraggy branches which are leafy only on the branchlets; by the close, persistent, white indument; by the shorter bracts, florets, akenes; by the exserted style divisions and the denser hairiness of the corolla tube.

Seemingly a rare plant; collected on an alkaline flat near Laramie, September 24, 1898, no. 5347. Also on Bacon creek, August 15, 1894, no. 910.

**Chrysothamnus Wyomingensis**, n. sp.—Tufted, 2–4<sup>dm</sup> high, bushy-branched from the base, the branches with ascending or

erect, yellowish-green branchlets, with a thin inconspicuous tomentum throughout: leaves rather numerous, especially above, 4–6<sup>mm</sup> long, narrowly linear, sharp-pointed, plane or somewhat canaliculate, viscidulous as are also the branchlets: inflorescence a narrow thyriform-panicle, rather leafy, at maturity barely surpassing the uppermost leaves: heads about 12<sup>mm</sup> high; bracts few (10–14), not in strict vertical ranks, mostly acute or acutish, glandular on the greenish keel, from glabrate to ciliate-pubescent: corolla tube and throat scarcely distinguishable, but slightly expanded upward, the lobes about one eighth of the whole length, obscurely short-pubescent below: style branches exserted, the appendages longer than the stigmatic portion.

This species has been secured but twice, both times on strongly saline soil, viz., at Buffalo, July 25, 1896, no. 2495, and on Vermilion creek, July 24, 1897, no. 3590. Its nearest ally in habit and some other characteristics is *C. frigidus*, but in form of inflorescence it approaches *C. Parryi* (Gray) Greene. It differs from *C. frigidus* in being almost devoid of tomentum, in its yellowish branches, its green leaves, narrow leafy inflorescence, and its exserted styles. It is also an earlier plant, one of the earliest of the several species of this genus in this region.

*CHRYSOTHAMNUS PARRYI* (Gray) Greene, l. c.—The habitat and range of this well-known species is always given as “parks of the Rocky mountains in Colorado,” but certainly similar parks in southern Wyoming, at least, must be added. Typical specimens are, J. H. Cowen, Breckinridge, Colo., August 1896; the writer’s nos. 2617 and 3495, Lincoln gulch, August 1896 and Big creek, August 1897.

*CHRYSOTHAMNUS HOWARDI* (Parry) Greene,<sup>3</sup> l. c.—The habitat of this, like the preceding, is given as “parks of the Rocky mountains,” but it should be stated that the *parks* are very different in their character. *C. Parryi* inhabits moist open ground, known as parks, occurring at intervals in the timbered mountain ranges. *C. Howardi* inhabits that other class of parks, viz., extensive, high, dry table-lands like North Park, Colo. and the Laramie plains. It occupies the dry foothills and ridges and I doubt not

<sup>3</sup> Dr. Greene’s papers cite the literature of all the well-known species so fully that it here seems necessary only to call attention to this fact.

may occur on the eastern base of the Rockies, possibly extending into eastern Nebraska, as given in Britton & Brown's *Flora*, a statement questioned by Dr. Greene. It seems probable that some confusion on this point has arisen by the distribution of a somewhat similar plant occurring in situations much like those in which *C. Parryi* occurs. This plant I think should stand as a species, and may be named as below.

**Chrysothamnus affinis**, n. sp.—Scarcely shrubby, the persistent base hardly more than a much-branched woody caudex: the season's stems very numerous, simple, 1–2<sup>dm</sup> high, yellowish, glabrate: leaves crowded, narrowly linear, acute, erect or spreading, dark green, nearly glabrous, 3–4<sup>cm</sup> long: inflorescence a crowded spicate thyrus which at maturity distinctly surpasses the leaves: bracts glabrate, arachnoid-ciliate on the margins, somewhat thickened-coriaceous, about three in each row; the outer with an ovate base, contracted in a usually spreading acumination; the inner linear-oblong, abruptly acuminate, shorter than the pappus: corolla tube slender, bearing only a few, minute, scattering clavellate hairs, shorter than the expanded, tubular throat which is cleft about one fourth its length: style appendages tardily but at length wholly exserted: akene linear-cylindric, about 6<sup>mm</sup> long.

Allied to *C. Howardi* (Parry) Greene, but clearly distinct by its less shrubby habit, its greenish glabrate aspect, and its crowded yellow inflorescence which surpasses the leaves. *C. Howardi* has cinerous leaves and stems, a dirty whitish-yellow inflorescence, and the leaves overtop the comparatively few and large heads whose bracts are distinctly arachnoid.

Excellent specimens were collected by J. H. Cowen, Jefferson, Colo., August 1896, and distributed as *Bigelovia Howardi* Gray. Type in Herb. University of Wyoming.

CHRYSOTHAMNUS AFFINIS **attenuatus**, n. comb. (*Bigelovia Howardi attenuata* Jones, Proc. Cal. Acad. Sci. II. 5: 691. 1895.—The specimen of Mr. Jones' type number, 5912, seems to approach *C. affinis* much more closely than it does *C. Howardi*. Its more persistent stems and longer branchlets, its very long acuminate bracts, and long exserted styles will readily distinguish it.

CHRYSOTHAMNUS COLLINUS Greene, Pitt. 3: 24. 1896.—This distinct and clearly characterized species I think has not been

collected except by the writer (no. 4435, Point of rocks, August 1897, near the type locality) since the original specimens were collected at Rock springs by Dr. Greene.

**Chrysothamnus oreophilus**, n. sp.—Green and nearly glabrous, 2–4<sup>dm</sup> high: stems several to many, from a thick woody base, strictly erect and somewhat fascicled, grayish with a thin tomentum, the annual twigs arising from near their summit, these also fascicled-erect, slender and yellowish-green: leaves erect, linear-filiform, very acute, canaliculate, green and glabrate, 3–5<sup>cm</sup> long: heads small (about 1<sup>cm</sup> high), in small fastigiate cymes: bracts oblong, abruptly sub-acute, only two or three in each vertical row, the scarious margins ciliate-pubescent: corolla sparsely short-hairy, divisible into three equal regions (tube, throat proper, and a transition region); lobes more than half as long as the tube proper, distinctly glandular-thickened at apex: pappus rather sparse: style appendages longer than the stigmatic portion, at length exserted: the short akene finely pubescent.

The erect habit of stems, the twigs and leaves, the greenish aspect, and numerous but small flower clusters mark this as peculiarly distinct from the other species of this range. It is abundant on stony slopes in the Bear river hills, near Evanston. Type number 4105, July 27, 1897. Represented also by M. E. Jones' no. 6040, distributed unnamed.

**CHRYSOTHAMNUS PUMILUS** Nutt., Trans. Am. Phil. Soc. 7: 323. 1840.—The recharacterization by Dr. Greene,<sup>4</sup> after every possible effort has been made to settle what was the original of the species, is of noticeable service to us all. This common and somewhat variable species is now recognizable. It is well represented by the following numbers from various parts of Wyoming: 617, 903, 1121, 1197, 2883, 3524 and 5398. The last, from Hutton's lake, September 7, 1898, is typical so far as I am able to judge.

**CHRYSOTHAMNUS PUMILUS varus**, n. var.—Smaller than the species, only 1–3<sup>dm</sup> high, the shrubby base divaricately scraggy branched, the season's branchlets slender, very numerous, 5–15<sup>cm</sup> long, with a whitish or straw-colored bark: leaves glabrous except for an obscurely scabrous margin, linear, almost filiform,

<sup>4</sup> Erythea 3: 93. 1895.



one-nerved, somewhat involute and usually more or less twisted, irregularly and widely divaricate, very numerous on the new wood and often fascicled on two-year old branches, short, rarely exceeding 3<sup>cm</sup>, usually much shorter: inflorescence and bracts much as in the species.

This is what has often been called in this range *Bigelovia Douglasii stenophylla* Gray. I have distributed some specimens under that name, but I am now satisfied that that is a very different plant and belongs to a more western range.<sup>5</sup> It occurs mostly on dry ridges and stony or sandy slopes. Type of the variety is no. 1847, Centennial valley, August 26, 1895. Another collection is no. 4434.

**CHRYSOTHAMNUS PUMILUS acuminatus**, n. var.—The habit of the species: numerous slender stems from a woody base 2–3<sup>dm</sup> high, with whitish bark: leaves numerous but early deciduous below, crowded toward the inflorescence, nearly filiform, ascending, somewhat twisted, 2–3<sup>cm</sup> long: inflorescence more paniculate than in the species; bracts lanceolate, long-acuminate with more or less spreading tips, nearly equaling the 5–6 flowered disk.

This variety I have from La Veta, Colorado, only, collected by Professor C. S. Crandall, August 21, 1897.

**CHRYSOTHAMNUS LANCEOLATUS** Nutt. l. c.—I see no reason for reducing this to a variety. Numerous collections of it show as much constancy in the essential characters as most of the recognized species. Its low tufted habit, its uniformly scabro-puberulent surface, and its either plane or twisted lanceolate leaves make it not hard to recognize. Specimens by the writer, nos. 889, 905, 2672, 2793, 5294 and 5314 are representative, as is also Professor Crandall's from Walden, Colorado, July 1894.

**CHRYSOTHAMNUS GLAUCUS** Aven Nelson, Bull. Torr. Bot. Club 25: 377. 1898.—At the time this was published only meager material was at hand, but it has since been secured in abundance. The characters as given are well borne out, except that in old specimens the leaves are less glaucous.

<sup>5</sup> I think it should be noted that *C. viscidiflorus* Nutt. l.c. (*Bigelovia Douglasii* Gray) occurs probably in a range to the northwest of that now under consideration, and that several of its varieties, though often attributed to the eastern Rockies, are not in this range at all. Among such may be named vars. *latifolius*, *serrulatus*, and *tortifolius*.

*CHRYSOTHAMNUS LINIFOLIUS* Greene, Pitt. 3: 24. 1896.—This I think has not been secured except in south-central Wyoming, where it occurs on the banks of strongly saline creeks. Its halophytic and hydrophilous nature is very marked, as it often grows with its “feet” in water so strongly impregnated with salts as to be wholly unfit for any use whatever. Its original collection was by the writer, on Poison Spider creek, no. 618, July 1894, but it was published upon material collected by the author of the species at Rock springs, August 1896. The writer has collected it also at Bitter creek and at Granger, nos. 4143 and 4137.

*CHRYSOTHAMNUS VASEYI* (Gray) Greene, *Erythea* 3: 96. 1895.—As pointed out by Dr. Greene, this has an akene quite at variance with the species that have preceded. The range given for it is too limited, for certainly very characteristic specimens are at hand as follows: G. E. Osterhout, North Park, Colorado, September 1897; by the writer, Big creek, August 11, 1897, no. 3494, and near Laramie, September 1898, no. 5331.

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